

## Global warming & heat wave facts & impacts

- **What is happening:** Heat waves: hotter & more often. 10 hottest years ever: all since 1998. Hottest year on record: 2014.
- **Immediate risk:** A long period of unusually hot weather can cause illness that is especially dangerous to elderly, small children and sick people such as fainting, heat exhaustion and heat stroke.
- **Medium term:** Mosquitoes like heat! They can fly faster, bite more, breed faster and move into new areas that used to be too cold for them.
- **Long-term:** If global warming is not stopped, summers could be 1.5°C hotter in SEA by the 2040s, and around 4.5°C hotter by 2100.

### Variation options:

#### What is happening

- Global temperature increase since 1980: on average 0,85 °Celsius
- Worst heat wave: more than 70,000 Europeans killed in 2003

#### Medium term

- Cities store heat & trap pollution that cause chronic illness, more heat strokes and diseases esp. in dense informal settlements
- More polluting energy used for cooling results in high costs and causes global warming
- Warmer more acidic seas kill coral reefs then tourists don't come – and may cut the southern Philippines fish catch in half in the next 25 years
- More long heat spells can lead to more forest fires

#### Long-term

- Coral reef dieback can lead to severe coastal erosion
- Governments around the world agree everything should be done to avoid the catastrophic consequences of letting global temperature rise more than 2°C.

## Changing seasons facts & impacts

- **What is happening:** Climate change throws nature's timing out of whack – with global warming, spring is starting earlier and rainy seasons are also changing.
- **Immediate risk:** When the monsoon is delayed, crops already planted are at risk of dying.
- **Medium term:** Seasons are getting more extreme too. Summer dry seasons will get hotter with up to 30 % less rains while rainy seasons get wetter with up to 30 percent more rain if we pass 2°C global warming.
- **Long-term:** Some plants and animals will need to migrate as seasons change. Farmers might need to change crops to plant some that grow better in the new climate conditions.

### Variation options:

#### What is happening

- Timing is important in Nature! Flowers bloom/ insects arrive/ birds migrate AND help farmers know when to plant their crops.

#### Medium term

- Farmers will have to adjust when to plant and harvest to the changing seasons.
- Monsoon timing is very important for agriculture and water supply, and variability increases risk of flooding and droughts in SEA.
- Extended summer drought will impact farmers' malnutrition and income, while more frequent wet season floods will impact housing, infrastructure and health. Too much flooding in the wet seasons can also damage crop fields.

#### Long term

- School term calendars might need to be shifted with new seasonal calendars and monsoon rains.

## Flood (changing rainfall patterns) facts & impacts

- **What is happening:** Scientists are learning that worldwide, extreme rainfall events are 12% more frequent than if there were no climate change. SEA is particularly affected, with 56% more strong rainstorms due to global warming.
- **Immediate risk:** Sudden intense rainfall can cause flash floods where old drainage systems cannot cope with so much water.
- **Medium term:** Wet season flooding may be more frequent (e.g. not every 10 years but every second year) and levels might be higher.
- **Long term:** More extreme events (such as river floods) will cause more population displacement, which already periodically occurs in flood-prone areas.

### Variation options:

#### What is happening:

- Warmer air holds more water, increasing the chance of intense rain & flooding
- “When it rains, it will pour”: global warming intensifies rainfall followed by longer dry periods.
- Intense monsoon rains in the mountains was a main factor in floods that devastated Pakistan in 2010 and Thailand in 2011.
- Floods and landslides are caused by many factors and changes in nature such as deforestation increase risk.

#### Immediate risk

- Sudden intense rainfall can cause flash floods where old drainage systems cannot cope with so much water.
- Children are at risk of drowning and houses and schools in low lying areas can be damaged.

#### Medium term

- Wet season flooding may be more frequent (e.g. not every 10 years but every second year) and levels might be higher.
- Vector-borne disease (like malaria & dengue fever, carried by mosquitoes), and waterborne illness (esp. diarrhea) is linked to more flooding.

#### Long term

- More extreme events (such as river floods) may cause more population displacement.

## Drought (changing rainfall patterns) facts & impacts

- **What is happening:** Very dry zones of the world have doubled since the 1970s.
- **Immediate risk:** When drought causes crops in the field to die and the harvest is very little, there is a risk of children going hungry.
- **Medium term:** Less food and less variety cause malnutrition, especially in children.
- **Long term:** Some crops and animals won't be able to survive in dryer conditions.

### Variation options:

#### What is happening:

- Less rain and faster evaporation in hot weather cause more drought.
- Dry spells lead to water scarcity, worsened by overdrawing groundwater.
- Droughts can have big impacts on food security and farmers income.

#### Medium term

- More frequent drought is possible in Indonesia, Vietnam, areas in Pakistan, eastern Bangladesh and India.
- Insect pests proliferate in hotter drier conditions.
- Less water for sanitation and hygiene creates greater disease risk, especially for children.
- More dry spells and droughts can lower crop yields (like rice), which means less food and less income.
- Less income might mean parents can't afford education and children might need to work to support their families.
- Daily farm workers might need to seek work in the city, where especially teenagers risk exploitation and trafficking.

#### Long term

- Some crops and animals won't be able to survive in dryer conditions.
- More farm workers and families might need to move to cities as frequent droughts and water scarcity make it difficult to farm for a living.

## Extreme winds and storms facts & impacts

- **What is happening:** The “storminess” of ocean winds and wave size are growing.
- **Immediate risk:** Coastal towns face more category 4 cyclone warnings (gusts over 200km/h).
- **Medium term:** Maximum wind speed is predicted to increase 6% for mainland SEA and 9% for the Philippines, but fewer may make landfall.
- **Long term:** There may be twice as many category 4 & 5 storms in the Philippines by 2100. Typhoon Haiyan (Yolanda) was the strongest storm ever recorded to make landfall: category 5 with winds over 300km/h!

### Variation options:

#### What is happening:

- Bigger storms develop in warmer, wetter conditions. Warmer oceans generate greater cyclone rainfall.
- Average ocean wind speeds have risen 10-20% in the last 20 years.

#### Medium term

- Fewer but bigger cyclones are expected to make landfall in SEA.
- As sea surface temperatures rise, tropical-cyclone rainfall is expected to go up (as much as 33%), which means higher flood risk in low lying and coastal regions.

#### Long term

- There may be twice as many category 4 & 5 storms in the Philippines by 2100. Typhoon Haiyan (Yolanda) was the strongest storm ever recorded to make landfall: category 5 with winds over 300km/h!
- Stronger cyclones create bigger storm surges: winds push huge waves into the coastal areas (similar to the size and strength of a Tsunami).

## Sea level rise / coastal erosion facts & impacts

- **What is happening:** While sea levels rose 10-20cm in the last 100 years, over the past 20 years it has risen twice as fast: about 3mm per year
- **Immediate risk:** With every storm there is a higher risk of coastal flooding
- **Medium term:** Sea level rise causes creeping salt water intrusion in coastal areas
- **Long term:** In a 2°C world, South Asia sea levels are projected to rise approximately 30–50 cm in 30 years, and a meter or more by 2100 in a 4°C world.

### Variation options:

#### What is happening:

- Sea Level Rise is mainly due to water expanding as it gets warmer, plus melting glaciers and polar ice
- When seawater reaches inland, it can erode the coastline, contaminate ground water & drinking water with salt-water intrusion, and increase flooding and storm surges.
- In Bangladesh about 20 million coastal people are already affected by salinity (making their drinking water unhealthy)

#### Medium term

- Saline contamination of drinking water contributes to more cases of diarrhea and other health risks, especially for pregnant women and elderly (sodium causes high blood pressure).
- Salinity and flooding have severe effects on agriculture

#### Long term

- The Mekong Delta and coastal cities like Manila and Bangkok are at high risk of coastal flooding. Business and economies will severely affected.
- Many people in coastal areas might be displaced and have to move inland or to other countries
- A 30-cm sea-level rise by the 2050s In the Mekong River Delta would increase the area affected by saline intrusion by over 30%

## Melting glaciers and polar ice facts & impacts

- **What is happening:** Glaciers and polar ice are melting! In only 10 years from 1998-2008 arctic ice decreased 10%
- **Immediate risk:** Melting glaciers can cause the formation of dangerous glacier lakes that can burst and lead to sudden flash floods in the Himalaya mountains of Bhutan, Nepal and India
- **Long term:** Melting glaciers and loss of snow cover pose a significant risk to stable and reliable water resources downstream

### Variation options:

#### What is happening:

- Until recent decades, glaciers normally melt a bit each summer then grow with new snow in winter
- Due to global warming now there is more summer melting and less winter snowfall

#### Long term

- Seasonal water scarcity in rivers may increase as glaciers shrink, especially in South Asia